



# Impact of COVID-19 on Global Dairy Supply Chain: A Review

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10.18805/ajdr.DR-1569

## ABSTRACT

**Background:** Disruption through present pandemic is applicable to almost all the sectors of economy. However, impact on Indian food and dairy industry is largely experienced considering it as the livelihood of sizable stakeholders emphasizing small and marginal farmers. Present study is undertaken to examine the global assessment of dairy supply chain with emphasizing on India, USA and Canada, which will be important to observe positive and negative trends of Covid-19 and suggesting appropriate measures for dealing with present and similar situations in near future.

**Methods:** Systematic literature review assessment had been followed from major web platforms like Jgate, Ebsco database and popular news articles were explored since December 2019 to April 2020 for the study purpose.

**Conclusion:** Along with supply chain assessment through its various components, it was observed that although different countries have negative effect on the dairy communities, but these adverse situations can be converted into new possibilities for expansion. It was also observed that dairy industry has the potential to convert present crisis into opportunity thereby not only concentrating on health part of consumers but also contributing towards generating employment.

**Key words:** Covid-19, Dairy industry, Employment, Global supply chain, Milk dumping.

Disease outbreak and global pandemics have been the greatest threat to human existence. In the current situation, the world is facing yet another pandemic as Coronavirus disease of 2019 (COVID- 19). Realizing the seriousness of the situation, every country has undertaken special steps to fight against the pandemic. Several Countries locked themselves, by restricting the movements and taken various non-pharmaceuticals steps like maintaining social distance, use of mask, sanitization etc. to prevent the outbreak from becoming deadly. In addition, many countries put the restriction in travel and trade, nationally or internationally to overcome the drastic effects of present pandemic. These all actions against the pandemic have vastly affected the world economy. Many sectors, school, business, shops working online to restricts the movements but agricultural and allied activities can not follow this protocol. Present crisis is impacting global food systems and has poised great threat to household food security by distracting provincial agricultural supply chains (Fao.org). The intensity of panic can be ascertained from the fact that it has curbed that supply chain who provides food, as rightly stated that 'farmers may not be infected but are affected for sure'. (Livemint.com; Mar. 31, 2020) Agriculture and allied activities are the most important economic sector which endorses sustainability to food security and human development. Dairy is an important sector in agriculture and contributes about one-third of the gross income of rural households (Budget, 2018). Importance of milk and its recognition in global trade is well known fact which can also be ascertained with last year production of around 827.88 billion litres contributing about 14% of global agricultural trade. Throughout the world, a large number of households are engaged in milk production especially in developing countries around 800 million families which constitute about 14% of world population are indulged in

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**How to cite this article:** Sharma, M. and Sinha, J. (2020). Impact of COVID-19 on Global Dairy Supply Chain: A Review. Asian Journal of Dairy and Food Research. 39(4): 273-277.

**Submitted:** 17-08-2020 **Accepted:** 08-09-2020 **Published:** 21-12-2020

this sector as major source of livelihood (Fao.org; Hemme and Otte 2010). Additionally, livestock rearing has also resultant in providing livelihood security to various rural poor households in the timeline. India leads both in terms of production and consumption and produce about 176 million tonnes of milk followed by USA and Pakistan (NDDB). Success story of Indian dairy industry is because of worldwide recognized model of dairy cooperatives under the lights of Amul, mother dairy, Sudha, Parag, Nandini etc. These cooperatives along with several local vendors travel the extra mile to procure milk from farmers and supply door to door in cities. Impact of the Covid-19 on the various sub sectors of dairy has affected the producers, suppliers as well as consumers. In the initial phase of lockdown, both procurements and sales of milk were affected due to supply chain disruptions. In one month period of mid-March 2020 to mid-April 2020 a decline of about 15% is observed in dairy liquid milk sales and in the same period a drop of about 8.8% in the ratio of sales to procurement was also observed as per data indicated by NDDB. But due to policy and proactive support of central and state government regarding the strengthening of supply and distribution

system dairy sector is showing steady progress (Financial express, 2020). The pandemic effect can also be observed in developed countries like USA and Canada.

USA, the second-largest producer in milk sector, was also upset due to present epidemic and its dairy supply chain has faced hiccups. Largely the disruptions in end to end linkages covering supply chain and cases of milk dumping has really push the industry on its downside. Major dilemma is that beside high demand if dairy products even in this pandemic it was reported that farmers were asked to dump the milk even by the largest dairy co-operative like Dairy Farmers of America.

The Canadian milk and dairy products, world-renowned for their excellence are recognized for their variety and high-quality. Canada projected lower profitability in the dairy sector due to decline in demand. Moreover, its supply chain also disrupted due to dumping of millions of litres of milk by the farmers which were asked to do so to stabilize the price by getting rid of the raw milk.

These effects of present pandemic have affected major dairy players in aforementioned country destinations. Not only the present supply chain has felt interruptions and caused a great deal of trouble but it has also resultant in the opportunity for exploring new dimensions of supply chain. Direct milk supply in various rural areas, processing plants operational through village level Farmer Producers Organizations (FPOs) are some of the trends which have advocated their importance in lieu of present epidemic. Based on the above facts present study was conducted with an objective to examine the impact of COVID -19 in the dairy sector in various important global destinations.

Present study has backed up with secondary data retrieved from various research articles, case studies and news articles (from December 2019 to April 2020) available at authenticated sources. Thorough literature review has been conducted from popularized resources such as JGate, EBSCO etc. The research followed systematic literature review procedure. The researcher tried to search various literatures using a particular keyword or combination of words on google scholar and online resources pertaining to the research objectives. Different combination of keywords like "Dairy industry", Covid and dairy", "milk supply and covid", "global dairy supply" "global pandemic" etc. were used as an individual and also in combination to country specific to retrieve suitable articles for study purpose. Additionally, desired information is also sought from the popular e magazines such as The Hindu, Financial Express, Reuters, BBC, FNB news etc. Major countries which have considered for supply chain assessment are USA, Canada and India. The assessment of dairy supply chain in each of these countries followed the inclusion of all important parts like farm level, processing level, retail level and distribution level.

Due to COVID-19, the dairy farm got a bad hit globally. Not only developing countries but also developed nations like the USA and Canada also badly affected due to COVID-19. Large number of dairy producers are enforced for milk

dumping due to low demand. In Canada, the situation was compounded by a dramatic decrease in business in hotels, restaurants and institutions sector (HRI sector), which resulted in a reduced requirement for dairy. They are planning to store dairy products until the market rebounds. The retailer is facing many difficulties to store dairy products because it requires a large space with a special atmosphere. In these conditions, the piling of dairy products will be cost-effective. But in the USA, the dairy system is safe with little precautions. The demand and supply are regular. The retailers are providing dairy products as per the demand. A developing country like India is facing a lot of difficulties, the domestic demand as well as bulk demands like restaurants, road-side, and marriages coming to a grinding halt. Meanwhile, the retailer is not facing that much of difficulties.

Country wise analysis and discussion on supply chain component is as under:

### **Impact on Indian Dairy Chain Farms**

The initial period of lock down was very crucial for dairy farmers as there was no clear guidance about what should be consider as essential commodity, which has affected the dairy farmers' livelihood severely. As a result, dairy farmers in many states like Punjab, Kerala, Karnataka and Assam had dumped thousand litters of milk in drain and roads because they don't have any idea what to do with the excesses milk that they could not sale or store due to unavailability refrigeration facility (FNB News, 2020). All these constrain lead to crashing of milk price in the unorganized milk sector. According to the vendors of Maharashtra, Karnataka and Assam there is ` 10.0, ` 1.50-2.50 and ` 4.00 price cut than the usual milk price respectively (Times of India, 2020). In our country major proportion of total milk production, that is around 70%, is being contributed by the small farmers. This livelihood is the only major for their immediate flow of liquid cash. The decrease in surplus of milk slowed down the flow of cash, disabling the farmer to buy fodder (FNB News, 2020). According to Pradip Gosh (March 2020), a dairy farmer "Milk still can be thrown, but the cattle are need to kept alive. Cattle are in miserable condition, even not capable to get up. The fodder price has risen up to ` 1300 while previously it was ` 1000. How we will meet the challenge of feeding 25kg/day to our cows?" (New Indian Express, 2020). "We have very less land holding and are primarily dependent on cattle feed from other states like West Bengal and Bihar, so due to country wide lockdown we are struggling to meet the feed demand of our cattle" said a commercial dairy farmer of Assam (FNB News, 2020). The fear of psychosis among the dairy farmers is creating a new problem, as they are trying to create restriction in excess of people from other villages or cooperatives, which is increasing hurdles in distribution of fodder and milk (The Hindu, 2020). At this time of crisis, to counteract these problems some new startups are emerging in Mumbai and trying to supply the cattle feed

at lowest possible price to small farmers (New Indian Express, 2020).

### Processors

Despite of all odds during this global pandemic our milk cooperatives such as Amul, Nandini, Mother Dairy and others has taken an extra step to procure the extra surplus of milk to support the farmers by producing skimmed milk powder (SMP) and milk fat (Business Standard). According to the data revealed by NDDDB, the SMP stock on 15<sup>th</sup> March was 70 thousand metric ton and by 30<sup>th</sup> April it will rose to 1.34 lakh metric ton, whereas the daily SMP production is about 1.5 thousand metric tons (Business Standard, 2020). Prior to global pandemic, some Indian dairy industry was running out of milk and was trying to import skimmed milk powder from New Zealand to meet their requirement. But now the pandemic COVID-19 helped them to restore and achieving balance to meet their demand (Yourstory, 2020). Moreover, in the past few weeks the price of global SMP have fell down to Rs 230/Kg from Rs 340/Kg (Business today, 2020).

### Retail

Retails stores, street vendors, restaurants and ice-cream parlors' shutdown and even of marriages and functions are not happening, which had brought down the sale of ice-cream almost by half. In the mean time "Consumers are showing more interest in buying products such as ghee, cheese and paneer in large quantities from retail stores. Paneer sales has risen up by 80% in the post lockdown phase with the averaging out of the situation" said R.S. Sodhi (Chairman and MD, Amul) (Business Today, 2020). "With the passage of time liquid milk sales are also showing positive and steady recovery with the support and proactive policies of central and state governments as the stores gradually opens in green and orange zones," said Dilip Rath, Chairman NDDDB (Business standard, 2020).

### Distribution

The initial shutdown restriction on milk sector overwhelmed procurement and sales as the consequences of disrupted transportation service. This disruption has severely impacted the unorganized/private sector milkmen (mithai shops, bakeries, creameries, milk contractors) as they have higher market share of 70%, while the organized sector (dairy cooperatives and private milk plants) handed only 30% (The Hindu, 2020). So, the unorganized players are now trying to deviate towards organized sector, which lead to subdued in the producers' price as the result of disparity between demand and supply. According to Dilip Rath, "after an initial impediment (March 15 - April 14), the sale of milk fell by 13.70% across the country while procurement of milk from farmers was less by only 3.50% while in the last two weeks of April a rise of 1.30% in milk sale was observed across the country" (Business Standard, 2020). Hence, observing the above data it can be concluded that in terms of procurement and milk marketing the dairy sector is trying

its best achieve a steady growth by taking some extra steps in its distribution channel.

The Karnataka Milk Federation, "Nandini" is procuring about 7 lakh liters of milk daily and distributing the poor people at free of cost. This initiative is supporting the dairy farmers' surplus as well as providing a better diet to the needy (yourstory.com, 2020). Unlike other FMCG players, the dairy companies are also trying to find new innovative ways to reach out their consumers. Some dairy companies like Lactalis India and Creamline Dairy have adopted direct distribution of milk and aid-products with their own vans in some residential areas (Business Today, 2020). Dairy companies like Amul is using e-commerce to enhance the marketing (Financial Express, 2020).

### Impact on Canadian Dairy Supply Chain Farm

Due to disruption in dairy supply chain management, farm sector has adversely affected. Dairy farms are functional besides social distancing due to COVID-19 between the emigrant to the farm and the rover. Convenience can be made without direct contact among those involved. Direct impact of COVID-19 on livestock feed based on the availability and the cost of certain ingredients, which provide milk. Even though production systems have not been affected in short term by the pandemic, the level of output has been hit high for dairy. During mid of March producers were allowed for "Quota Free days" i.e. producers are allowed to ship milk in excess of their quota without penalty become available to dairy producers in some parts of country so that incentives can be made available and reduced supply can be overcome. But there were incidences where dairy farmers were forced to dispose of certain milk shipments (DFO, 2020). Due to disruptions in the supply chain network, COVID-19 is causing the situation of dumping raw milk. In normal days, supply of fluid milk goes from a farm bulk tank to a retail fridge in a matter of days, but currently due to nil buffer capacity to hold milk it is not immediately processed. Due to this reason large quantity of milk of dumped to make room for new production. Canadian single-desk selling system for milk men works in synonymously with processors to coordinate production and marketing (DPAC, 2020).

### Processors

Present pandemic has affected the dairy processing sector also. Shut down of processing plants has really hit the sector and kneel it to the ground. No one has ever expected the long-term plant closures but major processing plants like Sanderson Farms at Mississippi send management as well as working employees keeping the plant open. Maple Leaf plant in Brampton was the first dairy plant in Canada which got hit due to present pandemic and till mid-April, 2020 it was kept closed for not allowing further chances of contamination (Maple Leaf, 2020). It is not only limited to the management part but the employees who are working inside can express their concerns over the health norms which is also causing a risk to the processing sector. Other

struggles of food industry in recruiting skilled staff under the lights of high un-employment with Covid-19 is also one of the major concerns. Adaptation of plants towards social distancing has also further questioned the increasing expectations for capacity. Further, larger processing facilities could disturb the food distribution chains, leaving behind Milk producers and their marketing boards searching for other outlets for their commodities.

### Retail

Retail industry in Canada has seen drastic demand changes in various sub sectors e.g. food retail sector and hospitality sector. Due to the effects of present pandemic former has observed positive changes while later governed with decrease in demand. There observed to be a drastic change in grocery stores sales from 2019 up-to week end of March 14 in 2020. Out of Total, Sales were nearly higher (46%) in grocery stores as compared to what was expected (33%). Current reports refer, that these retail stores supply fresh dairy, meat product to the customers. Sales at grocery stores has fallen after the stock piling by the consumers during mid-March, but the volume is still higher than previous years. This can infer due to reduction in demand of fresh Products like milk product, poultry product, meat etc. from store which is responsible for negative effect on fresh product supply chain business directly. Further making it more challenging as consumers are avoiding physical shopping along with limited shopping hours for shop keeper with very small no. of staff following social distancing in public places. Whole scenario potentially causing challenge to over-come the large volume demand among public with less means of marketing from producers to retail store and from retail store to consumer. Among all, milk demand is most affected; there is increased in 31% sales of milk at grocery stores as compared to earlier year, while 76% for butter showing more demand of product at home for baking and backlog of storable product during pandemic. As individuals are at home showing decrease in food service demand but increase in consumption demand of fluid milk will continue the sales at the same rate. Generally, hospitality sectors demand more cream and cheese as compared to at-home demand.

### Distribution

Product flow in the supply chain especially for food service to food retail requires significant forces which cannot be adjusted instantaneously when system is operating at optimum capacity. Present pandemic has caused the changes in the adjustment towards food distribution system with specific emphasis on food retail or services sector. Major grocery chains in Canada have their own distribution channels. Dairy processors supply their products in bulk quantity to the distribution network of grocery chains. Sysco and Gordon being the two major food service distributors comprising the majority of market share i.e. about 75%. Due to the shutdown, focus has shifted from these giants and it will take time for the formulation of latest distribution channels at food retail level.

### Impact on USA Dairy Supply Chain

USA has seen a surge of 1.7% in total production as compared past, due to this surplus and precautionary measures like slowdown due to COVID 19 has greatly affected its supply chain.

### Farm

USA got serious burn due to present endemic. Crisis has become so severe that even the farmers need to dump their milk leaving with no choices. Majority of cooperatives have also imprisoned through this situation. Up to 7% of all milk produced in the United States was dumped in first week of April (Newman and Bunge 2020). Due to low demand from processor, the loss is incurred by the dairy farmer and/or the cooperative in the region in which processor demand is significantly drops. As there are limited options for supply of produced milk e.g. one of grower at one of the biggest cooperative, Golden E Dairy, dumped around 4,700 gallons of milk from his 480 cows, as reported by Reuters. These all incidences have put the policy framework to protect the economic interest of many growers due to present endemic.

### Retail

Retail level has seen quite surge in the March end month. During the last week of March, 2020 retail purchase of fresh milk nearly rose by more than 50% and other processed products like butter and cheese have observed very huge sales by 127%, 84%, respectively, as compared to their previous respective counter time period. As per reported by the study of Nielsen, as compared to last year, average retail cow milk prices have rose to 11.2% non-clinching customers pockets.

### Distribution

This is alike in Canada for products that do not have central desk selling. Present pandemic has caused disruption in the supply chains and further causing tonnes of fresh produce to be wasted in the U.S. Due to perishable nature of commodities, this sector has got serious burn as compared to agricultural sector. Further, there need to be emphasis on innovative network for supply chain refinements to co-up the serious burn producers have faced due to disruption in the distribution channels.

It can be evident from Table 1 that farm sector is adversely affected in case of all the major 3 countries which is due to reason farmers were forced to dump the milk in regard of stabilizing price forces due to oversupply, moreover, lockdown effects in country like India has also ignited the adverse effects on producers. Retail segment is observed to have gained from the effects of present pandemic while so distribution sub sector has observed mix effects of present pandemic. In case of Indian dairy processing sector, trends are positive which is due to the major co-operatives available who have converted this crisis into opportunity. While in other countries processing plants remains shut down due to presence of COVID positive employees as the lockdown implementation was quite late in these countries.



**Table 1:** Summary sheet for effects of Covid-19 on global supply chain management.

Country name	Supply chain sub sectors			
	Farm	Processors	Retail	Distribution
India	-	+	+	+/-
Canada	-	-	+	+/-
USA	-	NA	+	+/-

Note: (+) represents the positive impact on particular sub sector due to pandemic; (-) represents the negative impact on particular sub sector due to pandemic; (+/-) represents the mix effects on particular sub sector due to pandemic; (NA) represents non availability of concerned data.

## CONCLUSION

COVID-19 has severely affected global food supply chain and its impact is devastating across the countries. The potential impact of virus in dairy sector is complex and varied across diverse segments that from the procurement, supply and consumption. Impact of present endemic has not observed to be universal among various producers around different countries. Although nations have negative effect on the dairy communities, but these adverse situations can be taken as opportunities. Covid-19 could benefit the dairy industry as consumers shifted from meat-based to dairy-based protein, from raw milk to processed article like ghee, cheese, paneer. Despite the shuttering of businesses in other sector, the dairy industry has persisted as one of the nation's critical industries in producing, processing, packaging, transporting, selling and serving fresh, safe, and nutritious dairy products to the nation and the world, which has potential to increase human health index as well as generate employment during the spread of COVID-19. Thus, dairy industries can think about the possibility and adding it to their crisis management plan to mitigate the impact of deadly virus.

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